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(54) APPARATUS AND METHOD FOR INJECTING SYNCHRONIZED DATA FOR DIGITAL DATA BROADCASTING

Abstract

Machine Translation [redacted]

1 The present invention relates to apparatus for injecting synchronized data for the digital data broadcasting transmitting supplementary data which make a synchronization so that the reference time of the corresponding digital data broadcast receiving system is transmitted before it becomes the playout time of corresponding synchronization data and the MPEG -2 audio / video transport stream which is compression coded according to the MPEG -2 standard and supplementary data making a synchronization be reproduced on a real time basis with corresponding video / audio data and method. For this, apparatus for injecting synchronized data the digital data broadcasting provides the synchronization data insertion / administration unit, in which the part controls the output of synchronization data from data storage module according to the insertion point when being calculated the part calculate the insertion point of synchronization data within the video / audio transport stream it uses selected synchronization data and the synchronization data selection / setting unit, setting up the entry value relating to the video / audio transport stream of a parameter the transport stream analysis section which produces the video / audio transport stream related information it analyzes the video / audio transport stream according to the set up entry value of a parameter, and the generated video / audio transport stream related information the addition data storage module which it manages it stores used supplementary data in the digital databroadcasting service, and the part select the video / audio transport stream which is input from an outside and synchronization

data making a synchronization between supplementary data stored in data storage module and the video / audio transport stream and synchronization data synchronization data in which the part is outputted from data storage module and the multiplexer which multiplexes the video / audio transport stream and outputted. Due to this, the interactive multimedia broadcasting service including the sub picture unit of the news progressed as the live program and the advertisement relating to the clothes which the quiz Shaw in which a viewer can participate, and the head of a drama suffer etc. can be provided on a real time basis.

Machine Translation Human Translation

PURPOSE: A device and a method for inserting synchronizing data for digital data broadcasting are provided to reproduce a synchronizing data at a receiving part before its reproducing time by properly inserting the data to MPEG-2 video/audio transmission stream, thereby providing the synchronizing data service in real time.

CONSTITUTION: A device for inserting synchronizing data for digital data broadcasting includes a synchronizing data selecting/managing part(410), an additional data storing part(420), a transmission stream analyzing part(430), a synchronizing data inserting/managing part(440), a reproducing time resetting part(450), and a multiplexing part(460). The synchronizing data selecting/managing part receives additional data-related information synchronized with MPEG-2 video/audio transmission stream from the outside via an interface, and carries out searching and selecting the same from the additional data storing part. If the data is not in the additional storing part, the data is inputted and stored from the outside. The additional data storing part stores and manages all additional data used in the digital broadcasting in the file format. The additional data storing part outputs synchronizing data according to a control signal output from the synchronizing data inserting/managing part. The synchronizing data inserting/managing part calculates a time for inserting the synchronizing data into MPEG-2 video/audio transmission stream, considering the packet number of the MPEG-2 transmission stream, the reproducing time of the MPEG-2 transmission stream, and the null packet number of the MPEG-2 video/audio transmission stream.

Representative Drawing

Fig. 2

Keyword

The digital data broadcasting, video / audio transport stream, supplementary data, synchronization, MPEG-2.

Descritption

Brief explanation of the drawing

2 Fig. 1 is a general block diagram of the digital broadcasting delivery system including apparatus for injecting synchronized data according to the embodiment of the present invention.

3 Fig. 2 is a block diagram showing the structure of the apparatus for injecting synchronized data according to a preferred embodiment of the present invention.

4 Fig. 3 is a flowchart showing the operation process of apparatus for injecting synchronized data according to the embodiment of the present invention.

5 Fig. 4 is a flowchart which successively shows the computational procedure about the insertion point among the synchronization data insertion process according to the embodiment of the present invention.

6 Fig. 5 is a flowchart which successively shows the process of reseting the playout time among the synchronization data insertion process according to the embodiment of the present invention.

7 Fig. 6 is a flowchart showing the process of multiplexing video / audio data and synchronization data among the synchronization data insertion process according to the embodiment of the present invention.

8 I. The description of reference numerals of the main elements in drawingsI

9 100: video / audio payload pary.

10 200: video / audio encoding part.

11 300:program multiplexer(PMUX)

12 400: apparatus for injecting synchronized data.

13 410: synchronization data selection / setting unit.

14 420: the part is data storage module.

15 430: transport stream analysis section.

16 440: synchronization data insertion / administration unit.

17 450: playout time reset part.

18 460: multiplexer.

19 500: PSIP / SI generating unit.

20 600: remultiplexer.

- Details of the Invention
- Purpose of the Invention

The Technical Field to which the Invention Belongs and the Prior Art in that Filed

21 The present invention relates to apparatus for injecting synchronized data for the digital data broadcasting and method, more particularly, to apparatus for injecting synchronized data for the digital data broadcasting which inserts the supplementary data (contents data) making video / audio data and synchronization and can transmit on a real time basis and method.

22 Generally, the problem the digital audio stored many data of an amount while the usage range was expanded to the different field including a communication, a computer, the electronics etc. and of transmitting came to the front.

23 The MPEG (Motion Picture Experts Group) -1 standard of the International Organization for Standardization load diversity was settled in 1991 year in order to resolve this problem. It is the state that expands this to a multi-channel and is completed

in the moving picture experts group international standard 1994 year November. As to MPEG-2, the various application including not only the mass storage media but also a communication, the broadcast media etc. is possible.

24 The existing data broadcast system doing based on this MPEG-2 algorithm provided the asynchronous data service which mainly used data carousel mode. The data carousel mode is the mode which periodically inserts supplementary data comprised the MPEG-2 video / audio transport stream and asynchronous and transmitted. After being stored in a receiver, transmitted asynchronous data are performed with the request of a user.

25 The asynchronous data service having the executive mode of the process of describing in the as a feature can provide the service like the weather forecast, stock information, news, the home banking etc without the timely related with video / audio data.

26 The playout time, that is, the broadcasting begin time is not defined. Therefore, the limit is found video / audio data and the timely motive in the synchronization data service providing which the supplementary data (balance information related data after the account inquiry using for example, the home banking) relating with this asynchronous data service providing has.

27 In order to solve this problem, the system model consisting of the middle the research for the synchronization data service providing using supplementary data making elementary stream (ES : Elementary Stream) and synchronization actively proceeds, and the DIWG (Data Interface Working Group) was presented. The DIWG (Data Interface Working Group) is the implementation working group of the ATSC (Advanced Television Systems Committee) of U.S. is different feature modules for the synchronization data broadcast system implementation.

28 But the model presented in DIWG includes the module which at the same time, multiplexes supplementary data etc. makes the video / audio, the video / audio and synchronization. But the problem that the problem does not have a compatability with the existing digital broadcasting transmitter for multiplexing only video / audio data and asynchronous data has as to a this.

29 There can be the patent of [the data service, using the patent name : digital television broadcasting system data service system and terminal, the application number : 10-2000-0018518, and the application yaer is : 2000 year] in which a patentee is the or more good luck as the related prior art. This relates to the service method, the part various by using the digital television broadcasting system provides data service, and in that way for providing the various additional service including the mail / paging service, the traffic information service, the game service etc. for a user by using the digital television airwave even though it does not pay the expensive mobile phone fee. A system and terminal.

30 But multiplex of supplementary data comprised video / audio data, video / audio data and asynchronous data service, data service system and terminal using this digital television broadcasting system are possible. But data service, data service system and terminal have the problem that it is incongruent for a multiplex with synchronization data in which the playout time is set up. Due to this, the limit is found in the broadcast service offer using supplementary data making video / audio data and synchronization.

31 Therefore, in order to previously arrive with the corresponding data playback time of the receiving side and it is reproduced on a real time basis video / audio data manufactured to the MPEG-2 algorithm and the supplementary data (interactive content) making a synchronization are inserted and it transmits. In that way apparatus for injecting synchronized data and the plan providing the synchronization data service on a real time basis are required.

Technical challenges of the Invention

32 The present invention is to provide apparatus for injecting synchronized data for the digital data broadcasting which solves the problem, and therefore, in order that synchronization data are received before it becomes the playout time of corresponding synchronization data and as to object of the present invention, the reference time of the digital broadcasting receive system is reproduced, it inserts supplementary data making video / audio data and synchronization into video / audio data when being appropriate and it transmits, and in that way can provide the interactive broadcasting service in which a viewer can participate on a real time basis. And method.

33 Moreover, it multiplexes only video / audio data and asynchronous data and it has the digital data broadcast sending system and the compatability transmitted on a real time basis. And apparatus for injecting synchronized data for the digital data broadcasting transmitting supplementary data making video / audio data and synchronization on a real time basis and method is to be provided.

▸ Structure & Operation of the Invention

34 Apparatus for injecting synchronized data for the digital data broadcasting for realizing a purpose as described above provides the synchronization data insertion / administration unit, in which the part controls the output of synchronization data from data storage module according to the insertion point when being calculated as described above it calculates the insertion point of synchronization data within the video / audio transport stream it uses the synchronization data selection / setting unit: transport stream analysis section: the generated video / audio transport stream related information as described above which produces the video / audio transport stream related information it analyzes the video / audio transport stream according to the entry value of the set up parameter as described above sets up the entry value relating to the selected synchronization data as described above and video / audio transport stream of a parameter the addition data storage module: part which it manages it stores used supplementary data in the digital databroadcasting service selects the video / audio transport stream which is input from an outside and synchronization data making a synchronization between supplementary data stored in data storage module and the video / audio transport stream and synchronization data synchronization data in which the part is outputted from data storage module and the multiplexer which multiplexes the video / audio transport stream and outputted.

35 The synchronization data insertion method for the digital data broadcasting according to the other feature of the present invention is equipped with the sixth step which in case the insertion for synchronization data and the fifth step: deciding whether or not of the paper inserting synchronization data into the video / audio transport stream is determined, it inserts synchronization data into the video / audio transport stream and multiplexes and outputs.

36 Moreover, the digital data broadcasting transmitter according to the other feature of the present invention is equipped with the program multiplexer: remultiplex portion inserting synchronization data into the video / audio transport stream in order to synchronization data making the video / audio transport stream and synchronization be transmitted in the receiving side and it is reproduced on a real time basis and extracts the specific transport stream among the synchronization data insertion part: transport stream received from the PSIP / SI generating unit, which produces the program guide information according to the predetermined standard for the program guide of the digital data broadcasting and managed the program multiplexer, the synchronization data insertion part and PSIP / SI generating unit and outputs with the video / audio transport stream it reconstructs and multiplexes and outputs converts the generated program specific information as described above into the transport stream packet it produces the program specific information about the packetized video / audio transport stream as described above it packetizes the video / audio payload pary: video / audio encoding part: video / audio transport stream received from the video / audio encoding part encodes and compresses video / audio data received from the video / audio payload pary it manages video / audio data applied from an outside is stored.

37 Hereinafter, as described in detail, a person skilled in the art is the preferred embodiment which easily can perform the present invention the same in the technical field in which the attached present invention belongs like a next.

38 In below the present invention, because of being the mpeg-2 video / audio transport stream, for the sake of convenience in illustration, it names to compression code the video / audio transport stream applied from an outside according to the MPEG - 2 standard. And because of being the MPEG-2 transport stream, it names among supplementary data applied from an outside to compression code data (the caption of the news, progressed as for example, the live program contents data etc. relates with ' pushing on approaching ' in the home shopping aired) making the mpeg-2 video / audio transport stream and synchronization according to the MPEG -2 standard. And because of being synchronization data, the video / audio transport stream for to transmitting with the receiving side and specific supplementary data making a synchronization are named among supplementary data applied from an outside.

39 Fig. 1 is a general block diagram of the digital broadcasting delivery system including the apparatus for injecting synchronized data (400) according to the embodiment of the present invention.

40 Referring to
Fig. 1, the digital broadcasting delivery system provides the video / audio payload pary (100), the video / audio encoding part (200), the program multiplexer (PMUX, 300), the apparatus for injecting synchronized data (400), the PSIP / SI generator (500) and multiplexer (600) it measures.

41 As to the video / audio payload pary (100), video / audio data of the fixed level received from an outside is stored. It manages.

42 The video / audio encoding part (200) encodes and compresses video / audio data received from the video / audio payload pary (100) according to the MPEG (Motion Picture Experts Group) -2 standard.

43 The program multiplexer (PMUX, 300) packetizes the mpeg-2 video / audio transport stream (TS : Transport Stream) received from the video / audio encoding part (200) to the packetized elementary steam (PES : Packetized Elementary Stream). And it produces the program specific information (PSI : Program Specific Information) about this and it produces this to the transport stream packet with conversion.

44 Among extension supplementary data (contents data including the sub picture unit of the news progressed as the corresponding subtitle and live program of the quiz Shaw in which for example, a viewer can participate etc), the apparatus for injecting synchronized data (400) selects data making the mpeg-2 video / audio transport stream and synchronization and it inserts. In order that it becomes the playout time (broadcasting begin time) of synchronization data, corresponding synchronization data is transmitted and the reference time (STC : System Time Clock) of the digital broadcasting receive system is reproduced on a real-time basis, it inserts synchronization data into the corresponding mpeg-2 video / audio transport stream and it transmits.

45 At this time, in order that it becomes the playout time of corresponding data, the reference time of the digital broadcasting receive system arrives and transmitted synchronization data are reproduced, after the synchronization data insertion point within the mpeg-2 video / audio transport stream is accurately calculated, it inserts according to the insertion point when being calculated and it transmits.

46 The PSIP / SI generating unit (500) produces the program guide information (the PSIP table or the SI table) of the ATSC (Advanced Television Systems Committee) standard or the DVB (Digital Video Broadcasting) standard for the program guide of the digital data broadcasting. It manages.

47 Among the different transport stream received from the apparatus for injecting synchronized data (400) and PSIP / SI generating unit (500), after the remultiplexer (600) extracts the PSIP / SI / PSI and it reconstructs, it re-assigns the packet identifier (PID : Packet Identifier) at each packet. Moreover, PCR (the box it is the Program Clock Reference, or less PCR) which are the program clock reference are modified and the corresponding transport stream is outputted.

48 Referring to the figure, if it finds out the apparatus for injecting synchronized data (400) within the digital broadcasting delivery system forming the structure of describing in the above in detail, it is attached it is the same as that of the next time.

49 Fig. 2 is a block diagram showing the structure of the apparatus for injecting synchronized data (400) according to a preferred embodiment of the present invention.

50 Referring to
Fig. 2, the apparatus for injecting synchronized data (400) provides the synchronization data selection / administration unit (410), and the part is data storage module (420), the transport stream analysis section (430), the synchronization data insertion / administration unit (440), the playout time reset part (450) and multiplexer (460).

51 As to the synchronization data selection / setting unit (410), the mpeg-2 video / audio transport stream for to transmitting with the digital broadcasting receive system and addition data-related information (the information including the file name and form etc) making a synchronization are input through the extension interface and it searches in data storage module (420) and the part chooses. At this time, in case it is confirmed that the synchronization data related file does not have the part in data

storage module (420), this is input from an outside and the part has affiliation with data storage module (420) with storage.

52 Moreover, the entry value of parameter related to the analysis cycle about the playout time establishment of corresponding synchronization data and mpeg-2 video / audio transport stream etc. the playout time of synchronization data inserted is measured is set up. It sets up in the initialization of a parameter through the user input signal or the TCP / IP, inputted from an outside through a keyboard, a mouse etc. RS232C, including, the input signal according to a communications with an outside etc.

53 It stores used all supplementary datas in the digital broadcasting service to the file format and the part data storage module (420) manages. And in case of being confirmed that it does not have the synchronization data related file inserted into the mpeg-2 video / audio transport stream through the synchronization data selection / setting unit (410), synchronization related data inputted from an outside through the synchronization data selection / setting unit (410) is stored to the file format and the part manages.

54 At this time, the output time point of synchronization data in which the part is stored within data storage module (410) follows the control signal from the synchronization data insertion / administration unit (440). And the output factor of this synchronization data is changed according to the transport stream packet number of synchronization data inserted into the mpeg-2 video / audio transport stream with the multiplexer (460).

55 The transport stream analysis section (430) periodically analyzes the applied mpeg-2 video / audio transport stream from program multiplexer (300 of the drawing 1, and PMUX) according to the mpeg-2 video / audio transmission stream analysis cycle which is set up through the synchronization data selection / setting unit (420) and it analyzes the number of the null packet included in the cycle and the PCR related information included in one cycle etc.

56 As to the synchronization data insertion / administration unit (440), by using synchronization data and the applied mpeg-2 video / audio transport stream related information, it calculates the synchronization data insertion point within the mpeg-2 video / audio transport stream from the synchronization data selection / setting unit (420) and transport stream analysis section (430). The packet count of the MPEG-2 transport stream, the null packet number of the mpeg-2 video / audio transport stream and MPEG-2 transport stream playout time etc. are considered in a calculation.

57 At this time, the null packet within the mpeg-2 video / audio transport stream is the packet which is transmitted in order to constant, maintain the output rate without effective data. In PID of this null packet, Ox1FFF for your reference always.

58 Moreover, by using the applied PCR related information from the insertion point and the calculated transport stream analysis section (430), while determining the output flag of synchronization data which the part selects, the part performs the control according to that among supplementary data stored within data storage module (410).

59 According to the playout time whether set or not of synchronization data through the synchronization data selection / setting unit (410), the playout time reset part (450) like that outputs synchronization data or it resets the playout time of corresponding synchronization data. That is, whereas the playout time of synchronization data is reset in case the playout time of synchronization data is set up, in case of being not, corresponding synchronization data is like that outputted.

60 As to the multiplexer (460), it multiplexes the mpeg-2 video / audio transport stream and MPEG-2 transport stream so that the PCR jitter phenomenon (the phenomenon having the error which is bigger than the maximum error in which PCR is allowed) occur and it outputs to one transport stream (TS).

61 It is the same as that of the next time referring to the figure, if the operation process of apparatus for injecting synchronized data for being comprised the structure as described above is illustrated it is attached.

62 Fig. 3 is a flowchart showing the operation process of apparatus for injecting synchronized data according to the embodiment of the present invention.

63 Referring to
Fig. 3, if file related information related to synchronization data (contents data including the caption of the news progressed as the live program and the quiz Shaw in which for example, a viewer can participate etc) that the synchronization data selection / setting unit (420) of the apparatus for injecting synchronized data (400) inserts into the MPEG-2 video / audio transport stream from the extension user interface are inputted, after synchronization data which are received by using this search whether it has the part within data storage module (410) and or not the part selects, the entry value relating to the analysis cycle about the mpeg-2 video / audio transport stream inputted on real time from the playout time and program multiplexer (300, PMUX) of synchronization data selected etc. of a parameter is set up (S310).

64 At this time, as to the synchronization data selection / setting unit (420), in case it is confirmed that the part does not have specific synchronization data fitting the synchronization data related information which is input from an outside in data storage module (410), synchronization data is input from an outside and the part has affiliation with data storage module (410) to the file format with the storage.

65 A next, and the synchronization data selection / setting unit (410) analyze synchronization data selected and it does the packet count and playout time of the transport stream etc. with the extraction (S320).

66 A next, and the transport stream analysis section (430) analyze the mpeg-2 video / audio transport stream inputted on real time from the program multiplexer (300, PMUX) according to the analysis cycle about the mpeg-2 video / audio transport stream which is set up through the synchronization data selection / setting unit (410) and it extracts the number of the null packet included in the synchronization data insertion point calculation within the PCR related information and corresponding cycle of the necessary mpeg-2 video / audio transport stream etc (S330).

67 As to a next, and the synchronization data insertion / administration unit (440), by using extracted synchronization related information (the packet count of the MPEG-2 transport stream, the playout time, the number of the null packet and PCR related information etc), it calculates the insertion point of synchronization data (S340). The number of null packet considered in the insertion point calculations repeatedly executes whenever it extracts the number of insertion point calculation of synchronization data is one cycle, that is, the null packet it each cycle is differents.

68 Moreover, the insertion point of calculated synchronization data comes under the PCR (Program Clock Reference) at the point of time of supplementary data in which the reference time (STC) at the digital broadcasting receive system is comprised video / audio data, video / audio data and synchronization before it becomes the playout time of corresponding synchronization data being together transmitted and being reproduced. That is, when the playout time of corresponding data became the reference time at the receiving side, in case data from the transmission side altogether does not arrive, the audio / video or synchronization data received in the receiving side cannot be brought back.

69 Therefore, in order that it becomes the playout time of corresponding synchronization data of the receiving side, as to apparatus for injecting synchronized data, data making video / audio data and synchronization arrive for the error prevention on this broadcast service, the insertion point of synchronization data is accurately calculated. And when being calculated, it follows and it inserts and it transmits on a real-time basis.

70 A next, and the synchronization data insertion / administration unit (440) determine whether or not of the paper inserting corresponding synchronization data into the mpeg-2 video / audio transport stream in the synchronization data insertion point when being calculated (S350).

71 According to the insertion whether or not decision time, and the analysis cycle of the mpeg-2 video / audio transport stream, the insertion point of the calculated synchronization data as described above and PCR which it periodically obtains is compared.

72 That is, if the synchronization data insertion point when being calculated is smaller than PCR which is greater than PCR which the synchronization data insertion / administration unit (440) obtains in the previous cycle and obtained in the current cycle, whereas it becomes selected synchronization data in which the part is stored in data storage module (410) with the output (S360), in case it is not so, it controls so that corresponding synchronization data in which the part is stored in data

storage module (410) can,bes unable to be outputted.

73 A next, and the playout time reset part (450) are inputted through the extension user interface etc. or it resets the playout time of synchronization data in which the part is selected in data storage module (410) than through the synchronization data selection / setting unit (420) (S370). That is, whereas the playout time of synchronization data is reset in case the playout time of synchronization data is set up, corresponding synchronization data is like that outputted in case the playout time of synchronization data is not set up.

74 Here, if it briefly illustrates for the reason for reseting the playout time of synchronization data which is already set up through the synchronization data selection / setting unit (420), it is the same as that of the next time.

75 Whereas video / audio data is generated after the MPEG -2 encoder to the mpeg-2 video / audio transport stream, it has no concern with video / audio data, after being stored, synchronization data are independently generated to the MPEG-2 transport stream with production.

76 But it does with reference to PCR of the mpeg-2 video / audio transport stream and the playout time of specific supplementary data for making video / audio data and synchronization has to be set up. Therefore, it has no concern with the mpeg-2 video / audio transport stream, the process of producing synchronization data and streaming this with electrical transmission cannot be advanced. That is, in case PCR of the mpeg-2 video / audio transport stream is done not know about, the playout time of synchronization data cannot be set up. But if the playout time of synchronization data is reset like embodiment of the present invention, it has no concern with the mpeg-2 video / audio transport stream, synchronization data can be streamed with the MPEG -2 electrical transmission. In the process of inserting the MPEG-2 transport stream into the mpeg-2 video / audio transport stream, this reset the playout time of synchronization data.

77 A next, and the multiplexer (440) multiplex the MPEG-2 transport stream in the mpeg-2 video / audio transport stream to one transport stream and it outputs (S380).

78 As described above, apparatus for injecting synchronized data for the digital data broadcasting transmits the mpeg-2 video / audio transport stream transmitted through the digital broadcasting delivery system and data making a synchronization on a real time basis. In order that it becomes the playout time of corresponding synchronization data, synchronization data arrives and the reference time (STC) at the digital broadcasting receive system is reproduced, it appropriately inserts synchronization data into corresponding audio/video data and it transmits. In that way it obtains the information which is necessary for a viewer on a real time basis. In addition, it can provide the interactive service through that on a real time basis.

79 Here, referring to the figure, if the operation process for reckoning the synchronization data insertion point is found out, it is attached it is the same as that of the next time.

80 Fig. 4 is a flowchart which successively shows the computational procedure about the insertion point among the synchronization data insertion process according to the embodiment of the present invention.

81 Referring to
Fig. 4, the synchronization data insertion / administration unit (440) calculates the collection of the cycle in which synchronization data which select in consideration of the null packet number of one during a cycle which is applied from the packet count and transport stream analysis section (430) of the MPEG-2 transport stream which is applied from the synchronization data selection / setting unit (410) etc. are inserted but which is required (S341). The following [the equation 1] is followed in a calculation.

Mathematical Formula 1

82

83 In order to calculate PCR required in a next, and the synchronization data insertion, the PCR increment of one during a cycle is reckoned (S342). The following [equation 2] is followed in a calculation.

Mathematical Formula 2

84

85 As described above, the synchronization data playout time according to the MPEG -2 standard considers only the increment of the PCR base per second increased up to 90,000 sick.

86 PCR in which a next, and synchronization data which selects by using the PCR increment (P_a) of the during a cycle as long as it is calculated are inserted into the mpeg-2 video / audio transport stream but which is required is calculated (S343). The following [equation 3] is followed in a calculation.

Mathematical Formula 3

87

88 By using the PCR (P_t) and the set synchronization data playout time required in a next, and the calculated synchronization data insertion, the synchronization data insertion point is reckoned (S344). The following [equation 4] is followed in a calculation.

Mathematical Formula 4

89

90 Next, among the synchronization data insertion process of being attached, if it finds out the process of reseting the playout time of selected synchronization data, the process is as follows:.

91 Fig. 5 is a flowchart which successively shows the process of reseting the playout time among the synchronization data insertion process according to the embodiment of the present invention.

92 Referring to
Fig. 5, before the playout time reset part (450) resets the playout time of synchronization data. By using the traffic signal which is input from an outside, whether the playout time of synchronization data was set up or not firstly confirms (S571).

93 If the confirmation result, and the playout time are not set up, whereas the playout time reset procedures is terminated, if the playout time is set up, the offset value of the playout time is calculated (S572). The following [equation 5] is followed in a calculation.

Mathematical Formula 5

94

95 By using a next, and the playback time offset (P_{off}) value of calculated synchronization data, the synchronization data playout time of being new is reset (S573). That is, the new playout time of synchronization data resets according to the following [equation 6].

Mathematical Formula 6

96

97 Next, among the synchronization data insertion process of being attached, if the mpeg-2 video / audio transport stream and MPEG-2 transport stream are found out about the process of multiplexing, the process is as follows:.

98 Fig. 6 is a flowchart showing the process of multiplexing data making video / audio data and synchronization among the synchronization data insertion process according to the embodiment of the present invention.

99 Referring to
Fig. 6, as to the multiplexer (460), it confirms whether the packet of the mpeg-2 video / audio transport stream inputted on a real time basis is the null packet or not (S681). PID allotted with the packet per inputted is used in a confirmation.

100 If it is not confirmation result, and the input packet of the mpeg-2 video / audio transport stream the null packet, whereas the corresponding input packet is like that the output (S684), if the input packet of the mpeg-2 video / audio transport stream is the null packet, it inspects whether the synchronization data packet inserted exists (S682). If the check result, and the synchronization data packet inserted exist, the replace (S683) one Hoo, and the replaced MPEG -2 transport stream packet are outputted to the synchronization data packet inserting the null packet (S684).

101 The detailed description of an invention and drawing is only illustrative of the present invention. This is not only the present invention used in order to limit the range of the present invention in the meaning limitation or the patent claim it is used in the purpose of illustrating. Therefore, the point that equal another actual example which changes and which is from this various if it grows up having the normal knowledge of this technical field is possible will be understood. Therefore, the extent of technical protection calming oneself down of the present invention should be determined with the technical mapping of the attached patent claim.

▸ Effects of the Invention

102 Apparatus for injecting synchronized data for the digital data broadcasting and method have the effect that supplementary data making the mpeg-2 video / audio transport stream and synchronization are transmitted. In order that transmitted synchronization data arrive before it becomes the corresponding synchronization data playout time at the receiving side and it is reproduced, synchronization data is appropriately inserted into the mpeg-2 video / audio transport stream and it transmits. In that way the synchronization data service including the caption of the news progressed as the live program and the advertisement relating to the clothes which the quiz Shaw in which the interactive multimedia broadcast service, that is, a viewer can participate, and the head of a drama suffer etc. can be provided on a real time basis.

Scope of Claims

Claim[1] :

103 Apparatus for injecting synchronized data for the digital data broadcasting storing used supplementary data in the digital databroadcasting service and includes the addition data storage module managed, the synchronization data selection / setting unit which selects the video / audio transport stream inputted from an outside among supplementary data, the transport stream analysis section analyzing the video / audio transport stream according to the entry value of the set up parameter as described above and produces the video / audio transport stream related information, the synchronization data insertion / administration unit, and synchronization data, and as to the synchronization data selection /, the part is stored in data storage module and synchronization data making a synchronization; and sets up the entry value relating to the selected synchronization data as described above and video / audio transport stream of a parameter; as to the synchronization data insertion / administration unit, it calculates the insertion point of synchronization data within the video / audio transport stream by using the generated video / audio transport stream related information as described above; and the part controls the output of synchronization data from data storage module according to the insertion point when being calculated as described above; and as to synchronization data, the part is outputted from data storage module and the multiplexer which multiplexes the video / audio transport stream and outputted.

Claim[2] :

109 Apparatus for injecting synchronized data for the digital data broadcasting of claim 1, wherein the entry value of a parameter is further comprised of the playout time reset part which includes the cycle which is used to analyze the playout time and video / audio transport stream of synchronization data; the playout time of synchronization data is set up with the synchronization data selection / setting unit; and resets the playout time of synchronization data to the set up playout time as described above.

Claim[3] :

113 Apparatus for injecting synchronized data for the digital data broadcasting of claim 1, wherein in the synchronization data selection / setting unit, synchronization data making the video / audio transport stream and synchronization of the part is not stored in data storage module; and it is applied about synchronization data from an outside and the part is stored in data storage module.

Claim[4] :

116 Apparatus for injecting synchronized data for the digital data broadcasting of claim 2, wherein the transport stream analysis section periodically analyzes and obtains the number of PCR (Program Clock Reference) which is included in one cycle the transport stream analysis section analyzes the video / audio transport stream according to the cycle which is used the transport stream analysis section analyzes the video / audio transport stream and the null packet included in one cycle.

Claim[5] :

119 Apparatus for injecting synchronized data for the digital data broadcasting of claim 4, wherein in the synchronization data insertion / administration unit, comparing the insertion point of synchronization data calculated through the synchronization data insertion / administration unit with PCR which periodically analyzes and obtained, the part determines output existence and nonexistence of synchronization data from data storage module.

Claim[6] :

122 Apparatus for injecting synchronized data for the digital data broadcasting of claim 5, wherein the insertion point of synchronization data calculated through the synchronization data insertion / administration unit is smaller than PCR which is greater than PCR which the synchronization data insertion / administration unit obtains in the previous cycle and obtained in the current cycle among PCR which periodically analyzes and obtained; and for the part, synchronization data is outputted from data storage module.

Claim[7] :

125 Apparatus for injecting synchronized data for the digital data broadcasting of claim 6, wherein the part is the output factor of synchronization data from data storage module is determined according to the transport stream packet number about synchronization data inserted into the video / audio transport stream.

Claim[8] :

127 A synchronization data insertion method for the digital data broadcasting comprising the steps of: among supplementary data which being used for the digital databroadcasting service, the video / audio transport stream applied from an outside and synchronization data making a synchronization are selected; the insertion for synchronization data and the fifth step: deciding whether or not of the paper inserting synchronization data into the video / audio transport stream is determined; and including the sixth step in which inserts synchronization data into the video / audio transport stream and which multiplexes and outputs.

Claim[9] :

134 The synchronization data insertion method for the digital data broadcasting of claim 8, wherein the first step is the step deciding the cycle analyzing the video / audio transport stream applied from an outside but is required.

Claim[10] :

137 The synchronization data insertion method for the digital data broadcasting which includes the step attaining for each period increment of the analyzed PCR as described above, and the step obtaining the null packet number of the video / audio transport stream within the cycle analyzing the determined video / audio transport stream as described above but is required while analyzing PCR of the video / audio transport stream according to the cycle analyzing the video / audio transport stream but is required of claim 9, wherein the third step above statement is determined.

Claim[11] :

142 The synchronization data insertion method for the digital data broadcasting of claim 10, wherein it calculates the insertion point of synchronization data by using the playout time of the number of null packets of the video / audio transport stream which the fourth stage obtains as described above and synchronization data and transport stream packet number.

Claim[12] :

145 The synchronization data insertion method for the digital data broadcasting including the step set up as the number of synchronization data inserting the minimum value of the null packet number of the video / audio transport stream into one during a cycles, the step that reckons the cycle when synchronization data is inserted but, the step calculating PCR, and the step subtracting PCR of claim 11, wherein: the fourth stage gains with above statement; the step that reckons the cycle when synchronization data is inserted but is required by using the transport stream packet number of the set up synchronization data as described above and null packet number of the video / audio transport stream obtained as described above; the step calculating PCR inserts synchronization data by using for each period increment of the PCR obtained as described above and the cycle required in the calculated synchronization data insertion as described above but is required; and the step subtracting PCR is required to insert the calculated synchronization data as described above in the playout time of synchronization data.

Claim[13] :

152 The synchronization data insertion method for the digital data broadcasting including the step comparing PCR of the video / audio transport stream and synchronization data insertion point, and the step that is smaller than PCR of claim 12, wherein the fifth step is counted with above statement, and the step that is smaller than PCR is greater than PCR which the synchronization data insertion point when being calculated as described above obtains in the previous cycle and obtained in the current cycle; and inserts synchronization data into the video / audio transport stream.

Claim[14] :

157 The synchronization data insertion method for the digital data broadcasting including a step, the step that is not video / audio transport stream packet the null packet; and multiplexes and outputs the video / audio transport stream, the step that the video / audio transport stream packet is the null packet; and inspects whether the packet about synchronization data, and the step that the packet of synchronization data inserted into the video / audio transport stream exists; it replaces a packet and null packet of synchronization data; and multiplexes and outputs the replaced synchronization data packet as described above of claim 13, wherein in the sixth step, it confirms whether the video / audio transport stream packet is the null packet or not, and the step that the video / audio transport stream packet is the null packet; and inspects whether the packet about synchronization data inserts into the video / audio transport stream exists.

Claim[15] :

164 The digital data broadcasting transmitter for video / audio data applied from an outside being stored and including the video / audio payload pary managed, the video / audio encoding part encoding and compresses video / audio data received from the video / audio payload pary, the program multiplexer, the synchronization data insertion part, the PSIP / SI generating unit, and the remultiplex portion extracting the specific transport stream among the transport stream received from the program multiplexer, the synchronization data insertion part and PSIP / SI generating unit and reconstructs and multiplexes and outputs, and the program multiplexer packetizes the video / audio transport stream received from the video / audio encoding part; and converts the generated program specific information as described above into the transport stream packet after producing the program specific information about the packetized video / audio transport stream as described above; the synchronization data insertion part inserts synchronization data into the video / audio transport stream in order to synchronization data making the video / audio transport stream and synchronization be transmitted in the receiving side and it

is reproduced on a real time basis and it outputs with the video / audio transport stream; and the PSIP / SI generating unit produces the program guide information according to the predetermined standard for the program guide of the digital data broadcasting and managed.

